CRM 89-64 / July 1989

RESEARCH MEMORANDUM

NAVY NURSE CORPS RETENTION: FY 1974 TO FY 1988

Timothy W. Cooke

A Division of CNA Hudson Institute

CENTER FOR NAVAL ANALYSES

4401 Ford Avenue • Post Office Box 16268 • Alexandria, Virginia 22302-0268

APPROVED FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

Work conducted under contract N00014-87-C-0001

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION / AVAILABILITY OF REPORT Approved for Public Release; Distribution unlimited.
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) CRM 89-64	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION Center for Naval Analyses 6b. OFFICE SYMBOL (If applicable) CNA	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) 4401 Ford Avenue Alexandria, Virginia 22302-0268	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING ORGANIZATION Office of Naval Research 8b. OFFICE SYMBOL (If applicable) ONR	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER N00014-87-C-0001
8c. ADDRESS (City, State, and ZIP Code) 800 North Quincy Street Arlington, Virginia 22217	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. 65154N; PROJECT NO. R0148; TASK NO.; WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) Navy Nurse Corps Retention: FY 1974 to FY 1988	
12. PERSONAL AUTHOR(S) Timothy W. Cooke	
13a. TYPE OF REPORT Final 13b. TIME COVERED FROM TO 14. DATE OF REPORT (Year, Month, Day) July 1989 15. PAGE COUNT 29	
16. SUPPLEMENTARY NOTATION	

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Active duty, Billets (personnel), Inventory, Manpower, Medical personnel, Naval personnel, Nurses, Officer personnel, Personnel retention, Shortages, Tables (data) (225)
05	09		

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This research memorandum documents the continuation and retention behavior of Navy nurses from 1974 through 1988. Aggregate continuation rates are presented along with cross-tabulations by years of service, paygrade, obligation status, entry cohort, accession program, and specialty. Policies to close the gap between nurse corps inventory and requirements are considered.

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT ☐ UNCLASSIFIED / UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL	22b. TELEPHONE (Include Area Code) / 22c. OFFICE SYMBOL

DD FORM 1473, 84 MAR

83 APR edition may be used until exhausted.
All other editions are obsolete.

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

CNA CENTER FOR NAVAL ANALYSES
A Division of Hudson Institute 4401 Ford Avenue • Post Office Box 16268 • Alexandria, Virginia 22302-0268 • (703) 824-2000

27 July 1989

MEMORANDUM FOR DISTRIBUTION LIST

Subj: Center for Naval Analyses Research Memorandum 89-64

Encl: (1) CNA Research Memorandum 89-64, *Navy Nurse Corps Retention, FY 1974 Through FY 1988*, by Timothy W. Cooke, Jul 1988

1. Enclosure (1) is forwarded as a matter of possible interest.

2. This research memorandum documents the continuation and retention behavior of Navy nurses from 1974 through 1988. Aggregate continuation rates are presented along with cross-tabulations by years of service, paygrade, obligation status, entry cohort, accession program, and specialty. Policies to close the gap between nurse corps inventory and requirements are considered.

Lewis R. Cabe
Director
Manpower and Training Program

Distribution List:
Reverse page

Subj: Center for Naval Analyses Research Memorandum 89-64

Distribution List

SNDL		OPNAV
A1	ASSTSECNAV MRA	OP-13
A5	CHBUMED	OP-134
FF42	NAVPGSCOL	OP-08
	Attn: Library	OP-08F
	Attn: Code 64	OP-801
FF44	NAVWARCOL (2 copies)	OP-801D
FF67	NAVFITWEPSCOL	OP-80D
FH1	COMNAVMEDCOM	OP-81
	Attn: NAVMEDCOM 03 (3 copies)	OP-813
		OP-813B
FH3	NAVHOSP BEAUFORT	OP-813C
FH3	NAVHOSP BETHESDA	OP-813D
FH3	NAVHOSP BREMERTON	OP-813R
FH3	NAVHOSP CAMP LEJEUNE	OP-82
FH3	NAVHOSP CAMP PENDLETON	OP-821
FH3	NAVHOSP CHARLESTON	OP-093 (6 copies)
FH3	NAVHOSP CHERRY POINT	OP-093M1
FH3	NAVHOSP CORPUS CHRISTI	OP-931 (2 copies)
FH3	NAVHOSP GREAT LAKES	
FH3	NAVHOSP GROTON	
FH3	NAVHOSP MARIANA ISLANDS	
FH3	NAVHOSP GUANTANAMO BAY	
FH3	NAVHOSP JACKSONVILLE	
FH3	NAVHOSP KEFLAVIK	
FH3	NAVHOSP LEMOORE	
FH3	NAVHOSP LONG BEACH	
FH3	NAVHOSP MILLINGTON	
FH3	NAVHOSP NAPLES	
FH3	NAVHOSP NEWPORT	
FH3	NAVHOSP OAK HARBOR	
FH3	NAVHOSP OAKLAND	
FH3	NAVHOSP OKINAWA	
FH3	NAVHOSP ORLANDO	
FH3	NAVHOSP PATUXENT RIVER	
FH3	NAVHOSP PENSACOLA	
FH3	NAVHOSP PHILADELPHIA	
FH3	NAVHOSP PORTSMOUTH	
FH3	NAVHOSP ROOSEVELT ROADS	
FH3	NAVHOSP ROTA	
FH3	NAVHOSP SAN DIEGO	
FH3	NAVHOSP SUBIC BAY	
FH3	NAVHOSP YOKOSUKA	
FH7	NAVMEDRSCHINST	
FH30	NAVMEDCOM PACIFIC REG	
FH30	NAVMEDCOM NATIONAL CAPTIAL REG	
FH30	NAVMEDCOM NORTHEAST REG	
FH30	NAVMEDCOM SOUTHEAST REG	
FH30	NAVMEDCOM EUROPEAN REG	
FH30	NAVMEDCOM MID-ATLANTIC REG	
FH30	NAVMEDCOM NORTHWEST REG	
FH30	NAVMEDCOM SOUTHWEST REG	
FJA1	COMNAVMILPERSCOM	
FJB1	COMNAVCRUITCOM	

CRM 89-64 / July 1989

NAVY NURSE CORP RETENTION: FY 1974 TO FY 1988

Timothy W. Cooke

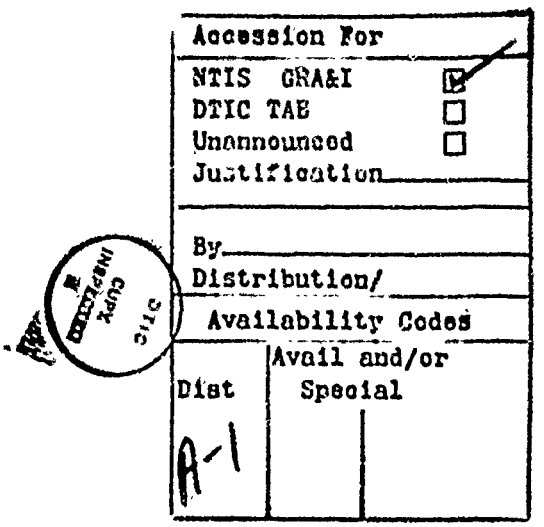
A Division of CNA Hudson Institute

CENTER FOR NAVAL ANALYSES

4401 Ford Avenue • Post Office Box 16268 • Alexandria, Virginia 22302-0268

ABSTRACT

This research memorandum documents the continuation and retention behavior of Navy nurses from 1974 through 1988. Aggregate continuation rates are presented along with cross-tabulations by years of service, paygrade, obligation status, entry cohort, accession program, and specialty. Policies to close the gap between nurse corps inventory and requirements are considered.



EXECUTIVE SUMMARY

This research analyzes recent nurse corps continuation and retention behavior. The analysis reported here was done for the Navy Surgeon General and Director of Navy Program Planning in support of the Navy Medical Flag Officer Working Group and the Joint Service Medical Professionals Retention Working Group. The major results can be summarized as follows:

- Aggregate continuation rates have been stable at between 90 and 93 percent since 1978. These rates are high relative to unrestricted line officers.
- The lowest continuation rates are observed at the completion of initial obligation. Between FY 1983 and FY 1988, two-thirds (67 percent) of nurses reaching the end of initial obligation continued in service beyond that point. The rate was somewhat lower in FY 1987 but recovered in FY 1988.
- Cumulative continuation rates have fallen for cohorts with less than ten years of service. Cumulative continuation rates for accessions from the Nurse Corps Candidate program were substantially lower than for direct accessions. The Nurse Corps Candidate program was discontinued in FY 1977 but, with congressional approval, will be reinstated.
- Selected specialist inventories are stable or growing. Growth of specialist inventories has been at the expense of general nursing staff.
- Forecasts of the nurse corps inventory, based on recent history, show a stable inventory that falls short of requirements. Accessions will have to be increased to about 450 per year to increase the inventory to currently authorized levels by FY 1993.

Because retention and continuation rates are already high, and the losses include retirements, a bonus policy oriented to retention is probably not cost effective. Commissioning incentives, such as bonuses and training subsidies, as well as additional recruiting investments, and other means of expanding the available pool of nurses are likely to prove more effective in eliminating the current shortage of Navy nurses.

CONTENTS

TABLES

INTRODUCTION

Increasing demand for Navy health care, without a significant change in the supply of Navy medical services, led to a sharp increase in 1986 and 1987 in the use of Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) financed medical care by dependents and retirees. In FY 1988, DOD shifted responsibility for Navy health care payments made through CHAMPUS to the Navy. As a result, there may be an opportunity to recoup substantial CHAMPUS expenditures at a net saving to the Navy by expanding or better utilizing Navy's medical resources. A previous analysis [1] for the Director, Program Resources Appraisal Division (OP-81) compared the costs of alternative sources of additional medical manpower required to fully utilize (where justified by demand) Navy medical facilities. Navy medical manpower is provided by officer, enlisted, and civilian personnel. Based on a facility survey conducted by Navy's Medical Command, the largest number of additional officers needed to fully utilize existing facilities are nurse corps officers.

The manpower management issues involved in addressing such a shortage fall into the categories of accession, retention, training, and distribution. This research memorandum documents retention in the Navy nurse corps. A separate retention analysis has recently been completed for the Navy medical corps [2]. Nurse corps accession issues are studied in a forthcoming memorandum. Specialty training provided by the Navy is considered only in the context of retention in the certified registered nurse anesthetist (CRNA) community.

DATA

Two data bases are used to analyze nurse corps retention. The official source of manpower data for the nurse corps is the officer master file (OMF) from which CNA has constructed the Longitudinal OMF covering the period from FY 1973 through mid-FY 1988. These data were used to identify the source of entry for nurse corps officers and calculate aggregate annual and cumulative continuation rates. However, much of the analysis involves nurse corps specialties that are more accurately tracked in the Bureau of Medicine Information System (BUMIS). CNA has end-of-fiscal-year BUMIS nurse corps data for six years, beginning with 1983. These data are used to compute retention at career milestones and to track the behavior of nurse corps specialists. General information on nurse corps career progression was obtained from [3].

CONTINUATION AND RETENTION BEHAVIOR

Nurse corps officers may be obligated to continue on active duty from the end of one fiscal year to the end of the next fiscal year, or they may serve without a legal obligation. For the period from FY 1983 through FY 1988, about 46 percent of nurse corps officers were obligated to continue on active duty through the next year. These obligations include the initial obligations of first-term officers, augmentation obligations associated with changing from a reserve officer on active duty to a regular officer, and obligations incurred for training provided by the Navy. Nurses who continue on active duty through the year, whether obligated or not, may acquire a nursing specialty for the first time or a new specialty. Continuation rates are used to track the flow of nurses through the inventory as well as to measure the propensity to

leave the nurse corps. There are many ways that continuation rates can be calculated for analysis and presentation. In particular, continuation rates computed for all nurse corps officers may mask the variance across career progression milestones and specialties.

AGGREGATE CONTINUATION RATES

The percentage of all nurse corps officers on active duty at the end of a fiscal year who are also on active duty at the end of the next fiscal year defines the aggregate continuation rate. Based on OMF data covering FY 1980 to FY 1988, an average of 92 percent of nurse corps officers continued on active duty from year to year.[1] Table 1 presents the calculations for FY 1974 through FY 1988. By comparison, the average annual continuation rate for the unrestricted line (URL) was 89 percent over the same period.

Table 1. Aggregate continuation rates in the nurse corps

Fiscal years	Start-year inventory	Number continuing	Continuation rate	URL continuation rate[a]
1974-75	3,096	2,541	82	93
1975-76	2,941	2,386	81	87
1976-77	2,875	2,223	77	87
1977-78	2,636	2,275	86	84
1978-79	2,537	2,258	89	89
1979-80	2,613	2,357	90	86
1980-81	2,645	2,424	92	87
1981-82	2,630	2,428	92	90
1982-83	2,666	2,485	93	90
1983-84	2,867	2,652	93	91
1984-85	2,892	2,630	91	88
1985-86	3,124	2,855	91	88
1986-87	3,111	2,857	92	85
1987-88	3,147	2,839	90	91

SOURCE: CNA Longitudinal OMF.

a. These rates are for unrestricted line officers, not including those in training designators. New accession nurses are already trained.

1. The cost of the losses reflected in these continuation rates are not evaluated in this research. They include recruiting costs, specialty training (if appropriate), and the value of skill enhancement obtained through on-the-job training.

A more revealing picture of continuation behavior is obtained by calculating the continuation rate by years of commissioned service, as depicted in figure 1 and table 2. Between FY 1984 and FY 1987, the continuation rate shows significant declines at years of commissioned service (YOCS) 3, 6, 7, 10, and 11. The rates then improve somewhat between FY 1987 and FY 1988. Though a rigorous explanation is not attempted in this memorandum, some additional background may be helpful for interpreting these changes. First, direct-accession nurses are commissioned with a three-year active duty obligation [3]. Thus, with relatively minor exceptions, the continuation rate at YOCS 3 reflects the retention behavior of individuals completing their initial obligation. Between FY 1985 and FY 1987, this continuation rate dropped by 14 percentage points. The decision to leave the nurse corps at this point is believed to be determined by job satisfaction, compensation, the relative attractiveness of civilian nursing, and life-cycle considerations. The net advantages of military nursing eroded somewhat as a result of the civilian nursing shortage that dates from 1986 or 1987. Navy manpower management changes that reduced promotion opportunities in accord with congressionally mandated grade restrictions probably contributed to the decline in continuation rates at YOCS 3.

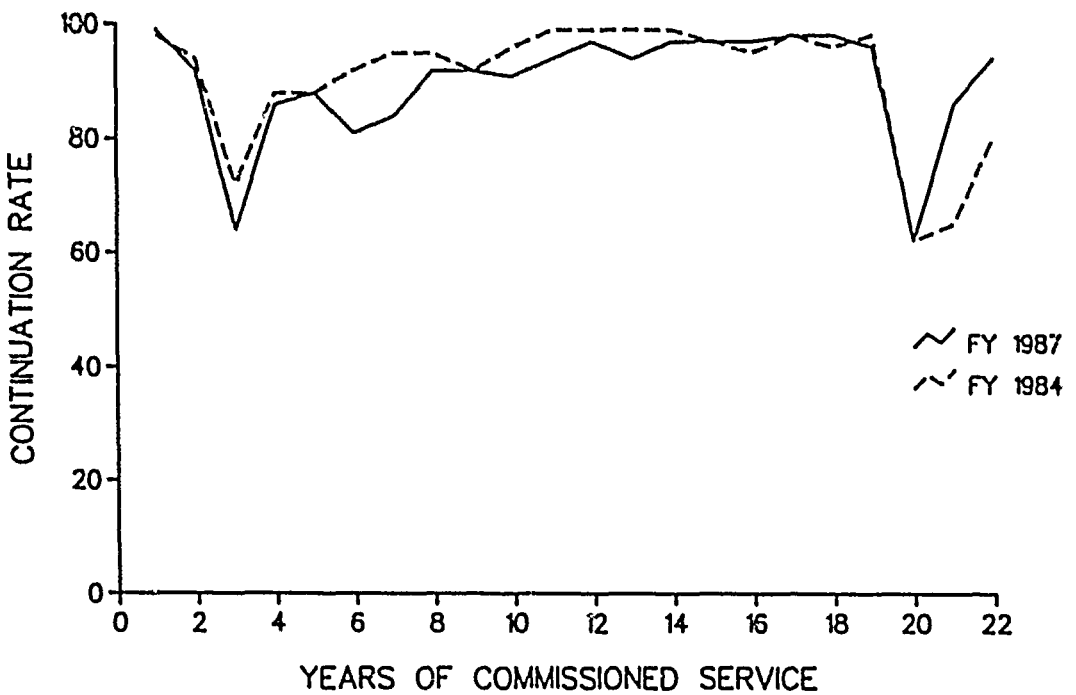


Figure 1. Navy nurse corps continuation rates by years of commissioned service (percent)

Table 2. Annual continuation rates in the nurse corps by years of commissioned service, FY 1984 through FY 1987 (percent)

	Fiscal year				
YOCS	1984	1985	1986	1987	1988
1	98	97	98	99	98
2	94	96	93	92	98
3	72	78	69	64	64
4	88	86	88	86	87
5	88	90	91	88	88
6	92	90	87	81	91
7	95	91	90	84	88
8	95	96	89	92	92
9	92	92	94	92	91
10	96	95	95	91	95
11	99	100	97	94	92
12	99	95	99	97	96
13	99	98	92	94	94
14	99	97	97	97	96
15	97	96	95	97	96
16	95	97	93	97	97
17	98	96	96	98	100
18	96	95	94	98	96
19	98	96	93	96	94
20	62	58	70	62	52
21	65	87	82	86	67
22	80	91	100	94	96

SOURCE: BUMIS.

Between YOCS 6 and 8, individuals have larger investments in their Navy nursing careers and, given the same changes in the civilian nursing situation, may be more reluctant to switch careers. The 11-percentage-point drop in continuation rates at YOCS 6 and 7 between FY 1984 and FY 1987 may be influenced more by factors such as changing promotional opportunity than the decline in retention at the end of initial obligation. Such internal changes are the most likely cause of the increased continuation rates at YOCS 6 and 7 in FY 1988. At YOCS 10 and 11, changes internal to the Navy are expected to be even more important in determining continuation rates.

Another potentially important way to disaggregate the continuation rates is by paygrade. Table 3 shows annual continuation rates by year for each paygrade. Except for paygrade O-2, the continuation rates are generally stable and do not show a downward trend. The lower continuation rates for paygrade O-2 may be associated with a slowing of promotions to O-3 and an associated increase in the fraction of lieutenant (junior grade) nurses who have fulfilled their initial obligation (three

years) and are eligible to leave. This phenomenon is further illustrated in tables 4 and 5, which show the continuation rates for paygrades O-2 and O-3 by YOCS and fiscal year. For O-2s, retention at YOCS 3 fell significantly in FY 1987 and FY 1988 relative to FY 1984 through FY 1986. This is probably associated with better civilian nursing options in those years. The aggregate continuation rate for paygrade O-3 is down only slightly in FY 1987 and back up in FY 1988. The FY 1987 decline in continuation rates for lieutenants at YOCS 6 and 7 accounts for all of the drop in the continuation rate of lieutenants. The FY 1988 decline in the continuation rate of O-5s occurs primarily at retirement.

Table 3. Annual continuation rates in the nurse corps by paygrade (percent)

	Fiscal year				
Grade	1984	1985	1986	1987	1988
O-1	98	93	96	98	96
O-2	95	94	77	84	84
O-3	88	89	89	87	89
O-4	94	96	96	96	96
O-5	96	93	94	93	87
O-6	85	86	90	90	89

Table 4. Continuation rates of lieutenants (junior grade) by years of commissioned service (percent)

	Fiscal year				
YOCS	1984	1985	1986	1987	1988
2	97 (157)[a]	98 (368)	94 (138)	92 (292)	99 (414)
3	69 (13)	77 (101)	66 (342)	56 (108)	60 (240)
4	--	--	30 (10)	56 (36)	--

SOURCE: BUMIS.

a. Number of individuals in parentheses.

Table 5. Continuation rates of lieutenants by years of commissioned service (percent)

YOCS	Fiscal year 1984	1985	1986	1987	1988
3	73 (172)[a]	79 (135)	85 (71)	97 (31)	92 (37)
4	88 (191)	86 (137)	91 (173)	90 (255)	87 (87)
5	88 (242)	90 (172)	91 (117)	88 (162)	89 (244)
6	92 (184)	89 (209)	86 (153)	80 (104)	91 (143)
7	95 (200)	90 (164)	90 (181)	82 (130)	89 (76)
8	94 (123)	96 (171)	87 (141)	91 (164)	89 (95)
9	75 (28)	81 (54)	93 (130)	91 (116)	89 (131)
10	62 (8)	83 (12)	80 (30)	83 (86)	88 (43)

SOURCE: BUMIS.

a. Number of individuals in parentheses.

CONTINUATION RATES BY TYPE OF OBLIGATION

Though annual continuation rates average 92 percent across the nurse corps in FY 1987, there is systematic variation by type of last obligation. Between FY 1983 and FY 1987, the majority of nurse corps officers did not have an obligation to continue serving through the next year. Table 6 shows that the continuation rate of unobligated nurses was 91 percent for FY 1984 through FY 1986. It dropped to 89 percent in FY 1987 (30 to 35 additional losses), and remained at that rate in FY 1988.

Table 6. Percentage of nurses remaining on active duty in the nurse corps by type of obligation

	Fiscal year of decision					
	1983	1984	1985	1986	1987	1988
Total						
At end of obligation	79 (462)[a]	85 (361)	84 (365)	73 (530)	74 (252)	76 (463)
Unobligated	--	91 (1,533)	91 (1,610)	91 (1,664)	89 (1,705)	89 (1,659)
At end of initial obligation	71 (268)	67 (143)	75 (192)	67 (388)	57 (120)	63 (262)
At end of training obligation						
YOCS 4-11	88 (25)	100 (18)	93 (15)	78 (18)	91 (11)	100 (8)
YOCS 12-19	92 (24)	100 (21)	100 (35)	100 (34)	100 (30)	97 (38)
At end of augmentation obligation	93 (124)	99 (153)	93 (99)	91 (58)	87 (69)	93 (141)

SOURCE: BUMIS.

a. Number of observations in parentheses. The continuation rates are defined for those whose records show, at the end of the year, that they reached the end of an obligation during the year. In addition, the individuals reaching the end of initial obligation were further constrained to have less than four years of service (YOS).

Retention rates for nurses at the end of an obligation, as identified on the BUMIS personnel records, are 15 to 18 percentage points lower than those of unobligated nurses. For those at the end of an obligation, there was a 10-percentage-point drop in retention rates (from about 84 percent to about 74 percent) between FY 1985 and FY 1986, and the rate stayed lower in FY 1987 and FY 1988. Among those finishing an obligation during a fiscal year, the lowest retention rates are associated with initial obligation.

Though the number of individuals finishing an initial obligation is relatively small, their retention rate fell sharply (from 75 to 57 percent) in FY 1987. However, in FY 1988, it recovered to nearly its FY 1984 and FY 1986 values. For those completing an obligation for training (40 to 50 nurses per year), continuation rates are generally higher than for unobligated nurses, especially for those completing a training obligation with 12 to 19 years of commissioned service. Though the number of nurses completing an augmentation obligation declined in FY 1987 to less than half the number in 1984, the retention rate for these individuals has also declined (from 99 percent in FY 1984 to 87 percent in FY 1987). This is somewhat surprising if augmentation is viewed as a career decision. In FY 1988, the retention rate at the end of augmentation obligation recovered to its FY 1985 value.

CUMULATIVE CONTINUATION RATES

Yet another informative way to view changes in continuation behavior is to follow entry-year cohorts for an extended period and calculate the percentage of the cohort remaining after YOS 4, YOS 6, YOS 8, or YOS 10. Table 7 presents these cumulative continuation rates. The four-year continuation rate for nurses entering in FY 1984 is the lowest of any cohort since 1976. The four-year continuation rate for the FY 1984 cohort is 11 percentage points below the average for the 1977 through 1982 entry cohorts. The six-, eight-, and ten-year continuation rates show similar patterns, with the lowest rates generally observed for the most recent cohorts. Lower continuation rates mean that larger accession cohorts will be required to enlarge the nurse corps inventory.

Table 7. Percentage of entry cohort remaining in the nurse corps at YOS 4 through YOS 10

Years of commissioned service	Fiscal year of cohort							
	1977	1978	1979	1980	1981	1982	1983	1984
YOS 4	74	67	74	72	68	71	65	60
YOS 6	55	55	58	56	53	59	50	--
YOS 8	50	46	48	42	37	--	--	--
YOS 10	45	39	40	--	--	--	--	--
Number in cohort	413	262	355	288	206	238	382	240

SOURCE: CNA Longitudinal OMF.

Between 1973 and 1976, there were two major accession programs for the Navy nurse corps. They were the Nurse Candidate program and direct appointments. The only other accessions during these years were 40 per year in 1975 and 1976 that were commissionings of enlisted hospital corpsmen. Table 8 presents cumulative continuation rates for each of the two major accession programs. For the 1974 through 1976 entry cohorts, direct appointment nurses were much more likely than nurse officer candidates to complete YOS 8 or YOS 12. The difference is 11 to 16 percentage points (60 to 70 percent lower for nurse candidates) at eight years of service. This difference in continuation behavior is relevant in considering the reinstatement of a nurse candidate program that was discontinued in 1977. Other things being equal, these lower continuation rates are associated with higher turnover costs. If the proposed nurse candidate program is executed with no more than 50 participants each year (as planned), the anticipated lower continuation rates may be practically unimportant.

Table 8. Percentage of entry cohort remaining in the nurse corps by source of entry

	Fiscal year of entry cohort			
	1973	1974	1975	1976
Nurse Candidate Program				
Years of commissioned service				
YOS 4	61	43	44	43
YOS 8	24	24	18	23
YOS 12	20	21	16	17
Number in cohort	339	472	169	106
Direct appointment				
Years of commissioned service				
YOS 4	45	53	47	55
YOS 8	31	39	29	39
YOS 12	27	35	28	30
Number in cohort	147	217	188	332

SOURCE: CNA Longitudinal OMF.

SPECIALIST INVENTORIES AND CONTINUATION

The Navy nurse corps has identified 33 classifications of nursing specialists, including a general professional (staff) nursing category. There are several levels of qualification, training, and certification required for a nurse to acquire a specialty designation. They include baccalaureate level of education, master's level of education, certification by an appropriate professional organization, advanced preparation in a Navy Medical Command approved course (non-degree), and significant experience in the field (on the job training). Training requirements are listed in [4] for each specialty. CNA conducted the following detailed analyses of several specialties, including (1) certified registered nurse anesthetists (CRNAs), (2) critical care nurses, (3) operating room nurses, (4) emergency room nurses, (5) nurse practitioners, (6) education specialtists, and (7) general (staff) nursing.

Table 9 tracks the year-to-year changes in the number of nurses in each of these specialties. From the beginning of FY 1984 through the beginning of FY 1988, the number of critical care, operating room, emergency room, and education specialists have increased significantly. The number of CRNAs has remained relatively stable, but the number of practitioners and, especially, staff nurses has declined. The decline in the practioner community reflects previous planning policy. The drop in the number of staff nurses was not planned, however.

The decline in the number of staff nurses reflects a more difficult recruiting environment, a lower retention rate at initial obligation, and a greater training rate for specialists. With few exceptions, the nurse specialists are staff nurses who obtain the training or experience required for specialization while in the Navy. Thus, specialist inventories have grown at the expense of staff inventories. Movement out of one specialty and into another is labeled a lateral loss in table 9. The number of lateral losses of staff nurses tripled between FY 1984 and FY 1987. Lower retention rates at the end of initial obligation have also tended to reduce the inventory of staff nurses. The number of staff nurses lost to active duty also increased between FY 1984 (145) and FY 1987 (189). In FY 1987, the number of accessions to general nursing (195) was about equal to the number lost to active duty, but lateral gains and losses yielded a net loss of 145 general nurses. Of course, recruiting objectives need to reflect both expected losses from active duty and to the specialty training pipeline. Current recruiting resources, and a more difficult recruiting environment in FY 1988, yielded a shortfall of about 140 accessions. Without this recruiting shortfall, the inventory of staff nurses would have remained unchanged between the beginning of FY 1988 and FY 1989. For the remaining specialties, the annual continuation rates (excluding lateral losses) exceed 90 percent in each specialty and year (with three exceptions). The losses used in these continuation rates include retirements.

Table 9. Selected specialist inventories, gains, and losses in the nurse corps by fisca ear

Specialty	Beginning inventory	Accessions	Lateral gains	Losses	Lateral losses	Others
General nursing						
1984	1,808 (45)[a]	+155	+8	-145	-63	+8
1985	1,767 (31)	+273	+19	-161	-106	+7
1986	1,799 (32)	+370	+18	-225	-169	+9
1987	1,802 (30)	+195	+37	-189	-182	+28
1988	1,691 (27)	+110	+23	-184	-182	+99
1989	1,557 (33)					
CRNA						
1984	129 (23)	+1	+13	-7	-4	+2
1985	134 (25)	+1	+1	-11	-4	0
1986	121 (17)	+1	+23	-9	-6	+2
1987	132 (26)		+14	-8	-2	+1
1988	137 (21)	+1	+11	-9	-4	+1
1989	137 (22)					
Critical care						
1984	50 (1)	+1	+3	-5	-1	0
1985	48	+5	+15	-1	-4	0
1986	63 (4)	+19	+21	-2	-6	+2
1987	97 (6)	+9	+27	-5	-8	+1
1988	121 (7)	+3	+22	-5	-7	+3
1989	137 (9)					
Operating room						
1984	158	+5	+8	-14	-5	+1
1985	153	+5	+25	-13	-7	+1
1986	164	+18	+51	-13	-4	+1
1987	213 (4)	0	+35	-17	-12	+3
1988	222	+4	+17	-21	-8	+2
1989	216					
Emergency room						
1984	60 (2)	+2	+13	-4	-1	0
1985	70 (1)	+5	+16	-3	-2	+1
1986	87	+4	+28	-6	-8	+1
1987	106 (4)	0	+49	-11	-16	0
1988	128 (7)	+1	+36	-14	-6	+1
1989	146 (8)					

Table 9. (Continued)

Specialty	Beginning inventory	Accessions	Lateral gains	Losses	Lateral losses	Others
Practitioner						
1984	89	+1	+1	-1	-6	+1
1985	85	+3	+3	-2	-8	+2
1986	83	0	+2	-6	-9	0
1987	70	0	+5	-7	-5	0
1988	63	0	+5	-8	-4	+3
1989	59					
Education						
1984	70 (2)	0	+14	-6	-2	+1
1985	77 (4)	0	+14	-3	-5	0
1986	83 (4)	0	+25	-7	-6	0
1987	95 (1)	+1	+16	-4	-13	0
1988	95 (3)	0	+29	-3	-4	+1
1989	118 (2)					

SOURCE: BUMIS.

a. Numbers in parentheses are in specialty training as of the beginning of the fiscal year.

CRNAs are an unusual community in several respects. First, about three-quarters of the CRNAs in the Navy are male (in comparison, about one-quarter of the nurse corps is male), and there are nearly 40 operational billets for CRNAs, all of which require male practitioners. Second, many male CRNAs have significant enlisted service as hospital corpsmen. This community has been stable since FY 1984 because the losses (including lateral losses) have been roughly equal to the number trained. The lateral losses average four per year and retirements have accounted for at least half of the losses to active duty.

CRNA education consists of one year of didactic and one year of practicum in addition to successful completion of the CRNA examination to become certified. The Navy has been training about 12 CRNAs per year, which has just been sufficient to maintain the size of the community. Increasing the size of this specialty will require increasing the number of CRNAs trained each year. Recruiting CRNAs from civilian practice does not appear to be feasible as a means of significantly increasing the size of the community. Because of the predominance of retirements among CRNA losses, a retention incentive would not be a cost-effective way to increase the size of the community.

FY 1989 projected losses (based on letters of intent as of December 1988) are presented in table 10 for each of the specialties. Because of the relatively extensive formal training required for CRNAs, the increased loss rate is of some concern. The total of 16 losses is the highest observed. However, of the 16 expected CRNA losses, 10 are retirements. If these expected losses materialize, the training pipeline will not even be sufficient to maintain the inventory at 115 trained nurse anesthetists. Despite higher loss rates in the critical care and education specialties, historical lateral transfer rates appear to be capable of maintaining or increasing the size of these specialties.

Table 10. Projected losses in the nurse corps for FY 1989 (as of December 1988)

Specialty	Trained inventory	FY 1989 projected losses		
		Retirement	Other	Total
General nursing	1,524	20	156	176
CRNA	115	10	6	16
Critical care	128	0	12	12
Operating room	216	6	10	16
Emergency room	138	1	11	12
Practitioner	59	5	0	5
Education	116	6	2	8

SOURCE: MEDCOM 512, BUMIS data base.

When the specialty inventories are broken out by YOS, it is apparent that, through the end of FY 1987, experience levels within the specialty inventories have either increased or stayed the same. Table 11 depicts the nurse corps experience distributions for four of the specialties. The largest change in experience distribution is that CRNAs have more military experience in 1987 than they did in 1983. Because of the relative ease (compared to physicians) of acquiring specialties in the nurse corps, and the unavailability of reliable specialty data before 1983, a more detailed examination of changes in specialty experience levels is not feasible or very meaningful.

Table 11. Specialty inventories in the nurse corps by YOS, FY 1983 and FY 1987 (percentage of inventory)

YOS	CRNA	Critical care	Operating room	Emergency room
1-9				
FY 1983	55	70	55	60
FY 1987	42	69	55	53
10-20				
FY 1983	43	26	43	37
FY 1987	57	25	41	45
Other and undetermined				
FY 1983	2	4	2	3
FY 1987	1	6	4	2

FORECASTING NURSE CORPS INVENTORIES

This research memorandum has analyzed historical retention and continuation behavior of Navy nurses. Changes in the rate at which individuals leave the Navy nurse corps is important as an indicator of the number of nurses that need to be obtained through recruiting and other means to maintain strength at (some fraction of) the authorized level. According to BUMIS data, the size of the Navy nurse corps peaked in FY 1986 at 3,111 members, declined slightly to 3,104 nurses in FY 1987, and fell to 3,068 nurses in FY 1988. As of January 1989, expected losses for FY 1989 are about 40 more than for FY 1988, but planned gains in FY 1989 are nearly 200 more than in FY 1988. The resulting planned growth for FY 1989, due to greater planned (but unrealistic) accessions, is 121 nurses.

However, even if recruiters have a good year in a tough market (275 to 300 total accessions), and if the nurse corps loss projections are accurate, the size of the nurse corps will fall again in 1989 to about 3,000 nurses, that is, to about 100 less than in FY 1986. With a growth in billets authorized in FY 1989 to 3,428, nurse corps manning would fall to 87 or 88 percent of authorized billets from its FY 1988 level of 90.5 percent.

Simulations of recent changes in continuation behavior can be used to forecast future nurse corps inventories and quantify policy objectives. Though it would be desirable to include behavioral responses to more attractive civilian nursing options and Navy policy variables like promotion opportunity in the simulation, doing so is beyond the scope of the current study.

The simulations reported here are simple inventory tracking models that forecast future nurse corps inventories from the FY 1987 inventory. Table 12 gives the assumed accessions for each year. They represent the number of accessions remaining at the end of the fiscal year, rather than recruiting goals. However, because losses during the initial YOS are small, this is practically the same as the number of nurses who begin service during the year. Unless Navy nurse corps recruiting receives additional resources or the civilian nurse market weakens, the accession assumptions in table 12 may be optimistic. For comparison, the Navy accessed an average of 275 nurse corps officers in FY 1987 and FY 1988.

Table 12. Assumed accessions in the nurse corps for FY 1989 through FY 1993

Fiscal year	Accessions
1989	250
1990	300
1991	325
1992	325
1993	350

Three alternative sets of continuation rates are used to produce the forecasts. They are (1) FY 1988 continuation rates by YOCS, (2) a weighted average of FY 1987 and FY 1988 continuation rates by YOCS, and (3) a weighted average of FY 1986, FY 1987, and FY 1988 continuation rates by YOCS. Individuals in YOCS 25 or greater are combined for ease of analysis. The results of the simulations are summarized in table 13.

Table 13. Simulated inventories in the nurse corps

Continuation rate assumption	1989	1990	1991	1992	1993
FY 1988	2,954	2,941	2,967	2,985	3,008
FY 1987-1988	2,937	2,919	2,947	2,963	2,980
FY 1986-1988	2,968	2,964	2,997	3,017	3,047

NOTE: Because about 25 active nurses appear on each year's file without an imputable YOCS, they are excluded from these simulations. A more accurate forecast would add about that many nurses to each of the numbers in this table.

With the accession assumptions in table 12 and recent continuation behavior, the Navy nurse corps is forecast to be smaller in each year through FY 1993 than it was in FY 1988. Given recent continuation behavior, increasing the size of the Navy nurse corps to the number of FY 1989 authorized billets of 3,428 by FY 1993 is projected to require accessions of about 450 nurses per year between FY 1990 and FY 1993. This is likely to pose a serious recruiting problem.

SUMMARY

Navy nurse corps continuation and retention rates are relatively high during the FY 1974 through FY 1988 period. The recent national shortage of nurses may be partly responsible for a recent decline in retention rates of Navy nurses at the end of initial and augmentation obligations, and among unobligated nurses at YOCS 6 or YOCS 7. Four-, eight-, and ten-year continuation rates are also lower for cohorts affected by the ongoing nursing shortage. Reduced promotional opportunities associated with past high retention within the nurse corps may also be associated with lower continuation rates since FY 1985. Continuation rates for nurse corps specialists are high and stable from FY 1983 through FY 1988; however, there is substantial movement between specialties within the nurse corps. The declining inventory of general nursing staff through FY 1988 is associated with higher recent losses, growth of specialty inventories through training of staff nurses, and difficult recruiting in FY 1988.

Simulation of nurse corps inventories through FY 1993 projects that, without greater emphasis on recruiting, nurse corps inventories will be stable or slightly declining through FY 1993. Because authorizations are increasing, nurse corps manning rates will decline. Though accession-retention tradeoffs for the nurse corps have not been quantified, the high observed retention rates and low Navy training costs argue in favor of accession-based policies for closing the gap between the nurse corps inventory and authorized billets.

REFERENCES

[1] CNA Research Memorandum 87-72, *A Comparison of Medical Manpower Costs: Military, Civil Service, and Contractor*, by Timothy W. Cooke and Peter E. Hilsenrath, May 1987 (27870072)[1]

[2] CNA Research Memorandum 88-231, *Medical Manpower Shortages and the Retention of Navy Physicians*, by Amy E. Graham, Laurie J. May, and Michelle A. Dolfini, Dec 1988 (27880231)

[3] Naval Medical Command, NAVMED P-5128, *Officer Career Guide*, 1985

[4] Naval Medical Command, NAVMEDCOM Instruction 1214.1, *Assignment of Medical Department Officer Subspecialty Codes*, 4 May 1987

1. The number in parentheses is a CNA internal control number.

APPENDIX

DETAILED RESULTS OF NURSE CORPS INVENTORY SIMULATIONS

APPENDIX

DETAILED RESULTS OF NURSE CORPS INVENTORY SIMULATIONS

This appendix presents more detailed results of the simulations summarized in tables 12 and 13. The simulated inventories and losses by YOCS are presented in tables A-1 and A-2 for the FY 1988 continuation rates.

Tables A-3 and A-4 contain the simulated inventories and losses using the weighted average of FY 1987 and FY 1988 continuation rates for each YOS.

Table A-5 and A-6 contain the simulated inventories and losses using the weighted average of FY 1986 through FY 1988 continuation rates for each YOS.

Table A-1. Simulated nurse corps inventories using FY 1988 continuation rates

YOCS completed	Fiscal year						
	1987	1988	1989	1990	1991	1992	1993
0	268	266	250	300	325	325	350
1	427	263	261	245	294	319	319
2	278	418	257	255	240	288	312
3	93	178	268	165	163	154	184
4	250	81	155	233	144	142	134
5	144	220	71	136	205	127	125
6	91	131	200	65	124	186	116
7	119	80	115	176	57	109	164
8	169	109	73	105	161	52	100
9	132	153	99	66	95	146	47
10	177	126	146	95	63	91	139
11	136	162	115	134	87	58	83
12	101	130	155	110	128	83	55
13	130	95	122	146	103	120	78
14	115	125	91	117	140	99	115
15	107	110	120	87	112	134	95
16	59	104	107	117	85	109	130
17	80	59	104	107	117	85	109
18	53	77	57	100	103	113	82
19	46	50	73	54	94	97	107
20	24	24	26	38	28	49	51
21	25	16	16	17	25	19	33
22	17	24	15	15	16	24	18
23	13	14	20	12	12	13	20
24	7	11	12	17	10	10	11
25+	25	23	26	29	36	33	31
Total	3,086	3,049	2,954	2,941	2,967	2,985	3,008

Table A-2. Simulated nurse corps losses using FY 1988 continuation rates

	Fiscal year					
YOCS	1988	1989	1990	1991	1992	1993
1	5	5	5	6	6	6
2	9	6	6	5	6	7
3	100	150	92	92	86	104
4	12	23	35	21	21	20
5	30	10	19	28	17	17
6	13	20	6	12	19	11
7	11	16	24	8	15	22
8	10	7	10	15	5	9
9	16	10	7	10	15	5
10	6	7	4	3	4	7
11	15	11	12	8	5	8
12	6	7	5	6	4	3
13	6	8	9	7	8	5
14	5	4	5	6	4	5
15	5	5	4	5	6	4
16	3	3	3	2	3	4
17	0	0	0	0	0	0
18	3	2	4	4	4	3
19	3	4	3	6	6	6
20	22	24	35	26	45	46
21	8	8	9	13	9	16
22	1	1	1	1	1	1
23	3	4	3	3	3	4
24	2	2	2	2	2	2
25+	9	8	9	10	13	12
Total	303	345	313	299	307	327

Table A-3. Simulated nurse corps inventories using FY 1987 and FY 1988 continuation rates

YOCS completed	Fiscal year						
	1987	1988	1989	1990	1991	1992	1993
0	268	266	250	300	325	325	350
1	427	264	262	246	296	320	320
2	278	408	252	250	235	283	306
3	93	178	261	161	160	151	181
4	250	80	153	224	138	138	130
5	144	220	70	135	197	121	121
6	91	125	191	61	117	171	105
7	119	78	107	163	52	100	146
8	169	109	72	98	150	48	92
9	132	154	100	66	90	137	44
10	177	123	143	93	61	84	127
11	136	164	114	133	86	57	78
12	101	131	158	110	128	83	55
13	130	95	123	149	104	121	78
14	115	125	92	119	144	100	117
15	107	111	121	89	115	139	96
16	59	104	108	117	86	112	135
17	80	58	103	106	115	85	110
18	53	78	56	100	103	112	82
19	46	50	74	53	95	98	106
20	24	26	28	42	30	54	55
21	25	19	20	22	32	23	42
22	17	24	18	19	21	31	22
23	13	15	22	16	17	19	28
24	7	10	12	17	13	13	15
25+	25	25	27	30	37	38	39
Total	3,086	3,040	2,937	2,919	2,947	2,963	2,980

Table A-4. Simulated nurse corps losses using FY 1987 and FY 1988 continuation rates

	Fiscal year					
YOCS	1988	1989	1990	1991	1992	1993
1	4	4	4	4	5	5
2	19	12	12	11	13	14
3	100	147	91	90	84	102
4	13	25	37	23	22	21
5	30	10	18	27	17	17
6	19	29	9	18	26	16
7	13	18	28	9	17	25
8	10	6	9	13	4	8
9	15	9	6	8	13	4
10	9	11	7	5	6	10
11	13	9	10	7	4	6
12	5	6	4	5	3	2
13	6	8	9	6	7	5
14	5	3	4	5	4	4
15	4	4	3	4	5	4
16	3	3	4	3	3	4
17	1	1	2	2	1	2
18	2	2	3	3	3	3
19	3	4	3	5	5	6
20	20	22	32	23	41	43
21	5	6	6	10	7	12
22	1	1	1	1	1	1
23	2	2	2	2	2	3
24	3	3	5	3	4	4
25+	7	8	9	10	12	12
Total	312	353	318	297	309	333

Table A-5. Simulated nurse corps inventories using FY 1986 through FY 1988 continuation rates

YOCS completed	Fiscal year						
	1987	1988	1989	1990	1991	1992	1993
0	268	266	250	300	325	325	350
1	427	264	262	246	295	320	320
2	278	407	251	249	234	281	305
3	93	185	271	167	166	156	187
4	250	81	160	235	145	144	135
5	144	221	72	142	208	128	128
6	91	125	192	62	123	181	111
7	119	80	110	168	54	108	159
8	169	108	73	100	153	49	98
9	132	156	100	68	92	142	45
10	177	123	146	94	64	86	133
11	136	166	116	137	88	60	81
12	101	132	161	113	133	85	58
13	130	94	123	150	106	124	79
14	115	126	91	119	145	102	120
15	107	111	121	88	114	139	98
16	59	102	106	116	84	109	133
17	80	58	100	104	114	82	107
18	53	77	56	96	100	110	79
19	46	50	73	53	91	94	104
20	24	28	30	44	32	55	57
21	25	19	22	24	35	25	43
22	17	24	18	21	23	34	24
23	13	16	22	17	19	21	31
24	7	11	13	19	14	16	18
25+	25	25	29	32	40	41	44
Total	3,086	3,055	2,968	2,964	2,997	3,017	3,047

Table A-6. Simulated nurse corps losses using FY 1986 through FY 1988 continuation rates

	Fiscal year					
YOCS	1988	1989	1990	1991	1992	1993
1	4	4	4	5	5	5
2	20	13	13	12	14	15
3	93	136	84	83	78	94
4	12	25	36	22	22	21
5	29	9	18	27	17	16
6	19	29	10	19	27	17
7	11	15	24	8	15	22
8	11	7	10	15	5	10
9	13	8	5	8	11	4
10	9	10	6	4	6	9
11	11	7	9	6	4	5
12	4	5	3	4	3	2
13	7	9	11	7	9	6
14	4	3	4	5	4	4
15	4	5	3	5	6	4
16	5	5	5	4	5	6
17	1	2	2	2	2	2
18	3	2	4	4	4	3
19	3	4	3	5	6	6
20	18	20	29	21	36	37
21	5	6	6	9	7	12
22	1	1	1	1	1	1
23	1	2	1	2	2	3
24	2	3	3	3	3	3
25+	7	7	10	11	13	13
Total	297	337	304	292	305	320